FINAL TECHNICAL REPORT
1997 November 24

TITLE: Does Pluto Have a Haze Layer?
GRANT NUMBER: NAG2-811
STARTING AND ENDING DATES: 1992 October 1 through 1995 September 30
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This document and attachments constitute the Final Technical Report for NASA Ames Grant NAG2-811 to Lowell Observatory.

The goal of this research was to determine whether Pluto has a haze layer through observations (with the Kuiper Airborne Observatory) of a stellar occultation by Pluto that was originally predicted to occur on 1993 October 3. As described in the attached material, our extensive astrometric measurements determined that this occultation would not be visible from Earth, and we canceled plans to observe it with the KAO. Efforts were then directed toward improving our astrometric techniques so that we could find future occultations with which we could satisfy the original goals of the research proposed for this grant. Reprints describing this work follow are attached.

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PLUTO

C. B. Olkin, Massachusetts Institute of Technology (MIT); S. W. McDonald, MIT; and J. L. Elliot, MIT and Lowell Observatory, write: "Recent astrometric measurements of Pluto-Charon and P20 (Mink *et al.* 1991, *A.J.* 101, 2255; Dunham *et al.* 1991, *A.J.* 102, 1464) from CCD strip scans at Lick Observatory (E. W. Dunham and C. Ford) indicate that Pluto's shadow will pass several thousand kilometers north of the earth, so that an occultation by Pluto will probably not be visible. However, depending on the exact northerly offset of the Pluto-Charon system from the DE202 ephemeris, an occultation of P20 by Charon may be visible from eastern Australia, Tasmania, and/or western New Zealand. High-quality observations of this event could detect a tenuous atmosphere (Elliot and Young 1991, *Icarus* 89, 244). Potential observers should monitor the combined light of Pluto, Charon, and P20 beginning about 15 min prior to and after the nominal midtime of Oct. $3^d08^h58^m$ UT. Photometry should have a time resolution of at least 0.2 sec."

NOVA SAGITTARII 1993

P. Garnavich, Dominion Astrophysical Observatory, communicates: "Another spectrogram of N Sgr 1993 was obtained with the 1.2-m telescope at DAO on Sept. 27.19 UT. The spectrum covered only the region around Hα at a resolution of 0.13 nm. Hα line strength has doubled relative to the continuum since Sept. 18. A deep absorption feature has developed at a velocity of −1140 km/s. The line has become box-shaped with more than 12 narrow emission components on top."

A. C. Gilmore, Mt. John University Observatory, reports the following photometry with Johnson-Cousins $UBVR_cI_c$ filters: Sept. 27.40 UT, V = 9.57, $U-B$ = −0.44, $B-V$ = +0.24, $V-R_c$ = +0.53, $V-I_c$ = +0.71 (1.31 air masses). The star SAO 186455, located 5′.9 west and 0′.6 north of the nova, was also measured as a possible comparison star: V = 9.31, $U-B$ = −0.12, $B-V$ = +0.08, $V-R_c$ = +0.05, $V-I_c$ = +0.17 (1.35 air masses). These stars were measured differentially from the provisional comparison star SAO 186445 (assumed V = 7.747, $U-B$ = −0.080, $B-V$ = +0.079, $V-R_c$ = +0.555, $V-I_c$ = +0.16). The assumed values appear good to ± 0.015 in all but $U-B$, where the uncertainty is ± 0.03 magnitude.

1993 September 28

Daniel W. E. Green